Analysis During System Planning". Of particular interest are the benefits and costs that accrue from using GIS (Table 2-1). NCDOT reports that GIS collection and analysis of environmental data (which is similar to the process proposed for socioeconomic data in this report) is more efficient, quicker, less costly and improves the communication and consensus process between the Department, regulatory agencies and the public.

Table 2-1: NCDOT GIS Benefits and Costs on Selected Projects (FHWA, 1998b).

Project	Benefits	Costs
Halstead Blvd	- Environmental Assessment (EA) reduced by 16 months. - Cost savings $150,000.	- GIS data collection, 3 months. - Cost $15,000.
Morganton Connector	- Early consensus, minor EA not major EA. - Cost savings $250,000.	- GIS documentation - Cost $20,000

Portland Metro's GIS Database (FHWA, 1998a)

Portland Metro is the regional government and the MPO that serves 1.3 million people in Clackamas, Multnomah and Washington Counties in Oregon. Metro provides all of the urban transportation planning for the region. Metro is the leading user of GIS-T for transportation planning in the country. The Data Resources Center (DRC) is the in-house department that is responsible for gathering base year data, producing forecasts and managing the database and GIS.

Portland Metro is recognized for its innovations in using GIS for activity-based models such as Transims (Los Alamos, 1999). Of particular interest to this research project is the Portland Metro use of GIS to store data using households as the unit of analysis. While Portland Metro uses a more disaggregate model than NCDOT does, the GIS lessons learned and benefits accrued are important for this research and eventual application in TransCAD. The benefits of storing both household and employment data at the disaggregate level are clear. When using TAZs as the unit of analysis, but storing data at the parcel level, it is simple to adjust TAZ boundaries when needed without concerns about losing data. Furthermore, data stored at the disaggregate level allows for data groupings other than standard TAZs (smaller TAZs can be created within a TAZ for smaller scale planning projects). Although the NCSU GIS database is stored in a polygon coverage based on parcels, a disaggregate format is maintained.

The GIS is known as the Regional Land Information System (RLIS). It stores 75 layers of demographic, employment, environmental and transportation data for the region in the form of polygon, arc and point coverages. The base maps and attribute data are continually updated and published quarterly in CD-ROM format. The GIS is maintained using ESRI's Arc/INFO software.

The Metro trip generation model uses disaggregate demographic data stored as point data records within the GIS. The point data represents separate survey data that have been